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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/15/2001

Juan Rojas Romero

FR9-2000-0059 (245)

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08/25/2004

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EXAMINER

BRANT, DMITRY

ART UNIT

PAPER NUMBER

2655

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/977,665	<b>Applicant(s)</b> ROMERO, JUAN ROJAS	
	<b>Examiner</b> Dmitry Brant	<b>Art Unit</b> 2655	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 15 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically, it is not clear from the specification whether “tagged data includ[ing] two consecutive words” refers to bi-grams, as described on Page 11 or tags composed of several words (Page 16, i.e. FIRSTNAMELASTNAME). Examiner interpreted claim 15 to refer to the latter (Page 16 definition).

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2655

4. Claims 1-4, 8-9, 12-13, 16-25, 28-29, 32-33, 36, are rejected under 35

U.S.C. 102(b) as being anticipate by Chou et al. (5,797,123).

The U.S. patent of Chou et al. discloses a computer based system and hence necessarily includes the computer code (claims 21-36) and the apparatus (claim 17) necessary to implement such a system.

Claim#	Limitations	Chou et al.
1, 17, 21	<p>A computer implemented speech recognition method for performing Natural Language Understanding (NLU) functions, comprising the steps of:</p> <p>(a) converting a user utterance into a plurality of basic speech units, said user utterance being a sequence of words expressing a query or a command</p> <p>(b) matching said plurality of basic speech units against a plurality of combinations of items, wherein each item is tagged data or is a concept code</p> <p>and (c) generating a combination of items likely to be representative of said user utterance.</p>	<p>System is implemented in context of sub-word speech recognition (Col. 4, lines 28-38 and Col. 5, lines 60-62) which inherently converts user's utterances to basic speech units (syllables, phonemes, etc.)</p> <p>Detected keywords are tagged with conceptual information once they are recognized (Col. 5, lines 27-30 and lines 57-60) and then verified at various stages (11, 12, 13, 14, FIG. 1)</p> <p>System produces verified sentence hypothesis (output of elem. 14, FIG. 1)</p>
2, 22	<p>The method of claim 1, said step (b) further comprising:</p> <p>(d) a first step of matching said plurality of basic speech units against a vocabulary of items to generate a first list of items likely to be representative of said user utterance.</p>	<p>Key-phrase detection (first list of items) using sub-word based speech recognizer, which inherently compares basic speech items against models</p>

		(vocabulary of items) (Col. 5, lines 60-67)
3, 23	The method of claim 2, wherein said step (d) is performed using Hidden Markov Models.	The models are HMM (Col. 5, lines 65-67)
4, 24	The method of claim 2, said step (b) further comprising: (e) a second step of matching said first list of items against said plurality of combinations of items to generate said combination of items likely to be representative of said user utterance in said step (c).	The use of anti-subword models during key-phrase verification produces a verified key-phrase. (Col. , line 66 - Col. 8, lines 16)
5, 25	The method of claim 4, wherein said step (e) is processed using a conceptual language model.	Anti-subword model is a conceptual language model (Col. 8, lines 17-20)
8, 28	The method of claim 4, wherein said step (c) is processed using a conceptual grammar.	Sentence parsing is done using "semantic constraint information" (Col. 10, lines 23-25 and Col. 11, lines 33-35), which is another term for conceptual grammar.
9, 29	The method of claim 2, further comprising: a training step defining said vocabulary of items of said step (d).	Subword HMMs are inherently trained. (Col. 9, lines 30-32)
12, 32	The method of claim 1, further comprising: storing a set of prototype acoustic models obtained from a training phase, wherein each said acoustic model represents one or more possible basic speech units of an utterance of a word.	Inherent to training process (Col. 9, lines 30-32). As it is well-known in the art, HMM models are stored in memory (Col. 12, lines 15-16)
13, 33	The method of claim 12, further comprising: assigning one of said acoustic models to each said basic speech unit .	Inherent to sub-word speech recognition, i.e. for each phoneme the system maintains a corresponding acoustic model (See Col. 4, lines 30-38)
16, 36	The method of claim 1, further comprising: sending said most likely combination of items to a function identification module to perform said user query or command.	System can be used to understand and perform user' queries, such as actions taken during automobile reservations (Col. 3, lines 65 - Col. 4, line 5)

18	<p>A speech recognition system for performing Natural Language Understanding, said system comprising:</p> <p>an acoustic processor, said acoustic processor for receiving a user spoken utterance and determining a string of labels identifying a corresponding sound of said user spoken utterance</p> <p>a decoder communicatively linked to said acoustic processor, said decoder determining a likely sequence of items corresponding to said determined string of labels</p> <p>a conceptual pronunciation dictionary providing said decoder with a pronunciation of said items</p> <p>a conceptual syntax module providing said decoder with a set of allowable combined items</p> <p>and a target function identification module communicatively linked to said decoder, said target function identification module executing a function corresponding to said likely sequence of items.</p>	<p>Subword model recognizer in key-phrase detector (11, FIG. 1 and Col. 5, lines 60-63)</p> <p>Key-phrase detector/verifier (11, 12, FIG. 1) and sentence hypothesizer/verifier (13,14, FIG. 1) use HMM models (22, FIG. 1 and Col. 5, lines 60-63)</p> <p>Lexicon (23, FIG. 1)</p> <p>Key-phrase grammars, anti-subword models (21,24, FIG. 1) and semantic information (25, FIG. 1)</p> <p>Output of (14, FIG. 1) goes to reservation system manager, etc. (Col. 3, lines 65 - Col. 4, line 5)</p>
19	<p>The system of claim 18, wherein said decoder comprises a fast acoustic match and a detailed acoustic match.</p>	<p>Key-phrase detector/verifier (fast match 11, 12, FIG. 1) and sentence hypothesizer/verifier (13,14, FIG. 1)</p>
20	<p>The system of claim 18, wherein said conceptual syntax module comprises a conceptual language model or a conceptual grammar.</p>	<p>Anti-subword models (24, 27 FIG. 1) or semantic information (25, FIG. 1)</p>

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-7, 10-11, 14-15, 26-27, 30-31, 34-35, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chou et al.

The U.S. patent of Chou et al. discloses a computer based system and hence necessarily includes the computer code (claims 21-36) and the apparatus (claim 17) necessary to implement such a system.

As per claims 6-7, 26-27, Chou et al. do not disclose the use of n-grams.

However, Chou et al. disclose computing confidence measures for the key-phrase of N words using combined likelihood ratios of all N sub-words (Col. 8, line 45-51), which are very similar to well-known n-gram models except that the individual likelihoods of subwords in Chou et al. are not conditionally dependent on the previous words, as it occurs in n-gram models.

The examiner takes the official notice that the use of n-gram conceptual models is notoriously well-known in the art of speech recognition. In these models, probability of an n-gram is expressed as:

$$p(s) = p(w_1)p(w_2|w_1)p(w_3|w_1w_2)...p(w_l|w_1...w_{l-1}) = \prod_{i=1}^l p(w_i|w_1...w_{i-1})$$



where  $p(w_i)$  is a probability derived from the training of the model on a large corpus of data. (See U.S. patent # 6,374,217, Col. 5, lines 17-49)

While Chou et al.'s patent suggests that n-grams would not benefit Chou et al.'s system during the keyword detection stage (Col. 5, lines 35-48), the use of n-grams would not contradict Chou et al.'s teachings in the key-phrase verification stage. Indeed, since Chou et al. already teach computing probabilities (likelihoods) for key-phrases with multiple words, the use of n-gram probabilities would ensure removal of key-phrases with low combined probabilities (Col. 8, lines 44-46). In other words, key-phrase verifier could use n-grams to verify the key-phrase instead of finding combined likelihood ratios.

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify Chou et al. to use n-grams derived from initial training, in order to compute probability (confidence measure) of each detected key-phrase by combining corresponding subword-level probabilities (Col. 8, lines 44-46), so as to improve the accuracy of the verification process and remove key-phrase hypotheses that have scores lower than a predetermined threshold (Col. 8, lines 52-55). The motivation for doing so is suggested by the combination of N word likelihood ratios in Chou et al., which is very similar to computing n-gram probabilities, as it is well-known in the art. (Col. 8, lines 44-46).

As per claims 10-11, 30-31, Chou et al. do not explicitly disclose "defining said plurality of combinations of items of said step (c) in a training step." However, Chou et al. disclose using "semantic constraint information" for sentence parsing.

However, the examiner takes the official notice that, as it is well-known in the art, "semantic constraint information," (a.k.a. conceptual grammar) necessarily requires the initial step of training, since such information (sentence structure) can only be inputted in the system by human operators (at least initially).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made that Chou et al.'s method of using "semantic constraint information" necessarily involves initially training (inputting) said "semantic constraint information" into the system, so as to enable the system to later automatically use said "semantic constraint information" for key-phrase sentence parsing and verification.

As per claims 14, 34, Chou et al. do not disclose that user's utterance is in the form of isolated data ("i.e. 'Pedro Romero', as described in Specification, page 7)

However, Chou et al. teach parsing various types of key-phrases ("in downtown Chicago," "in the morning", etc. - See. Col. 5, lines 20-25) and also teach using the system for dialogue-based automobile reservation. Hence, the examiner takes the official notice that, as it is well-known in the art, dialogues with automobile reservation systems involve questions of type: "Please say your name..." etc, which require a reply in the form of isolated data. Many other examples exist in the art, such as dialogues with voice-mail systems, airline reservation systems, etc.

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify Chou et al. to process "user's utterance in the form of isolated data" in order to support various types of input required for the reservation/voice-mail systems.

As per claims 15, 35, Chou et al. do not explicitly disclose tags containing two consecutive keywords.

However, Chou et al. disclose key-phrases containing a number of consecutive words, i.e. "in downtown Chicago, etc." identifying local geographic area. (Col. 5, 20-26), which could be processed by using n-grams, such as bi-grams (as explained in rejection for claim 6).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to modify Chou et al. to use a tag such as LOCAL\_GEOGRAPHIC\_AREA for identification of the key-phrase or a combination of tags, such as AREA+TIME ("in the morning") in order to allow the system to handle complex user queries by using "semantic constraint information which specifies permissible combinations of key-phrase tags" (Col. 10, lines 23-25) - Note: the use of 'combinations of key-phrase tags' implies presence of at least two key-phrase tags.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bellegarda (6,374,217) teach using n-grams for semantic language modeling.

Sukkar (6,292,778) teaches utterance verification using with subword-bases minimmm verification error training.

Lee at al. (5,675,706) teach sub-word based keyword detection with tagging.

Martin (5,642,519) teach using speech recognition with tagging.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dmitry Brant whose telephone number is (703) 305-8954. The examiner can normally be reached on Mon. - Fri. (8:30am - 5pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Ivars Smits can be reached on (703) 306-3011. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Tech Center 2600 receptionist whose telephone number is (703) 305- 4700.

DB

8/17/04

*Nguyen T. Vo*  
8-19-2004

NGUYEN T. VO  
PRIMARY EXAMINER